# Quality Assurance Program for the TVA Kingston Ash Recovery Project

#### EMDQ Workshop Arlington, Virginia | March/April 2011

#### Presented by:

Stephen D. Brower, P.G., Geosciences Department Manager / Associate Principal - Environmental Standards, Inc.

#### Co-authors:

William J. Rogers, Neil E. Carriker – Tennessee Valley Authority Rock Vitale, Ruth Forman, Dennis Callaghan – Environmental Standards, Inc.

Acknowledgments to Kim Abbott - Environmental Standards, Inc. and Robert Crawford - Tennessee Valley Authority

maintaining the data needed, and c including suggestions for reducing	ompleting and reviewing the collect this burden, to Washington Headqu uld be aware that notwithstanding ar	o average 1 hour per response, inclu- ion of information. Send comments arters Services, Directorate for Infor yy other provision of law, no person	regarding this burden estimate or mation Operations and Reports	or any other aspect of the 1215 Jefferson Davis	nis collection of information, Highway, Suite 1204, Arlington	
1. REPORT DATE 31 MAR 2011	2 DEDORT TYPE			3. DATES COVERED <b>00-00-2011 to 00-00-2011</b>		
4. TITLE AND SUBTITLE		5a. CONTRACT NUMBER				
<b>Quality Assurance</b>	ecovery Project	5b. GRANT NUMBER				
				5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)				5d. PROJECT NUMBER		
				5e. TASK NUMBER		
				5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)  Environmental Standards, Inc,1140 Valley Forge Road,P.O. Box 810,Valley Forge,PA,19482				8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)		
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited						
	11 DoD Environme	ntal Monitoring & I nt or Federal Rights	- •	rkshop (EMI	OQ 2011), 28 Mar ?	
14. ABSTRACT						
15. SUBJECT TERMS						
16. SECURITY CLASSIFIC	17. LIMITATION OF	18. NUMBER	19a. NAME OF			
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	Same as Report (SAR)	OF PAGES 30	RESPONSIBLE PERSON	

**Report Documentation Page** 

Form Approved OMB No. 0704-0188

## Agenda

- Client Background/ Tennessee Valley Authority (TVA)
- Project Background/ Event Facts
- Environmental Standards' Involvement
- Activities, Challenges, and Notes of Interest
- Project Accomplishments
- Conclusions





#### TVA Kingston Fossil Plant

- Tennessee Valley
   Authority (TVA)
   Kingston Fossil Plant
  - 1.7-GW coal-burning power plant
  - Bordered by two rivers – Emory and Clinch
  - Uses on average 14,000 tons coal/day

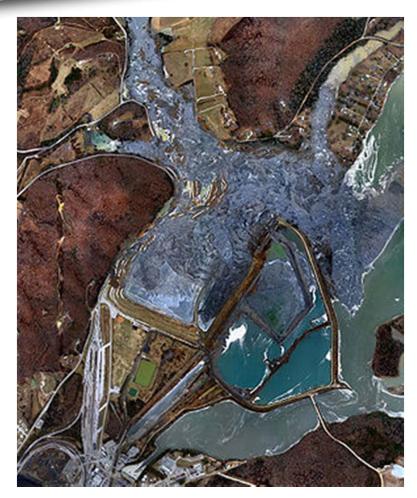


June 2007



#### Project Background/Event Facts

- December 22, 2008, shortly before 1 AM
- Ash dyke of 84-acre containment pond ruptured
  - 5.4 million cubic yards of fly ash into the Emory River
  - 1.1 Billion Gallons
  - Impacted over 300 acres



**December 23, 2008** 



### Challenges?

- Many challenges in the initial response:
  - Organization
  - Resources
  - Planning
  - Health and Safety
  - Data Quality





#### **Incident Command**

- TVA sample collection and environmental management in action within hours
- Sample collection begins with minimal documentation
- Regulatory agencies arrive
- Incident Command System (ICS) set up within days





#### **Decision-Making**

- Rapid decision-making but still, disorganization
- "Who is in charge" in spite of ICS and team efforts
- TVA environmental specialists rotate in on weekly basis but have substantial responsibilities elsewhere



#### Field Sample Collection

- Understaffed TVA field sample collectors
  - Previous downsizing by TVA and elimination of Field Manual
  - No Standard Operating
     Procedures (SOPs) applicable to specific project collection activities
  - No consistent nomenclature





#### **Data Management**

- TVA IT staff rotated members on-site to manage Scribe Access<sup>™</sup> and implement data reasonableness rules
- It becomes obvious that assistance is needed and there were needs for longer term
  - Planning
  - Staffing
  - Niche consulting expertise



#### **Environmental Standards' Involvement**

- Contracted January 21, 2009 One month after event
- Provided
  - Observations and concerns
  - Global and specific recommendations
  - Initiated immediate actions to assist



#### **Immediate Observations**

- Amazing effort from TVA personnel
  - Sustainable?
- Plans Lack of overall QA plan and SOPs
- DM tools and process
  - Very manual
- TVA personnel
  - need to return to pre-December 22 roles and have project structure put into place





#### Immediate Concerns

- Concern about integrity and quality of data
  - Initially lab data
- Need bulletproof, legally defensible data
  - Sampling issues
  - Laboratory issues
  - Data issues
- Crisis management
  - December 22, 2008 to March 2009





#### **Global Recommendations**

- Move away from Crisis to Project Management
  - Overall program/process
    - Sampling Point of Contact
    - Chemistry Point of Contact
    - Data Point of Contact
  - Step back and reassess
    - Roles and responsibilities
    - Business process/supporting functionality
    - Vendors/assist procurement



#### **Specific Recommendations**

- Initial steps
  - Develop overall QA Plan document
    - Insert quality system, oversight for lab services, lab procurement
  - Transition from existing business process day 1 forward
    - Real time data assessment of current data
  - Assume sampling oversight and training develop SOPs
  - Implement data management process
- Assessment and loading of past data
  - Depends on lab production of data packages
  - Proofing output from database
  - Rigorous data validation



#### Immediate Actions: Data Management

- Implement a full cycle Data Management Process
- Implement an Enterprise Level Data Management System
  - Automating to maximum extent
    - Sample planning
    - Correctness / completeness checking
    - Automated data review verification
    - Data validation support
    - Web Reporting (Self Service)
- Develop Data Management Plan



#### **Immediate Actions: Quality Management**

- Quality Assurance Plan even though approval was months in coming
- Review/Add Laboratories
  - Time, quality, cost pick two
  - Capable of electronic data deliverables



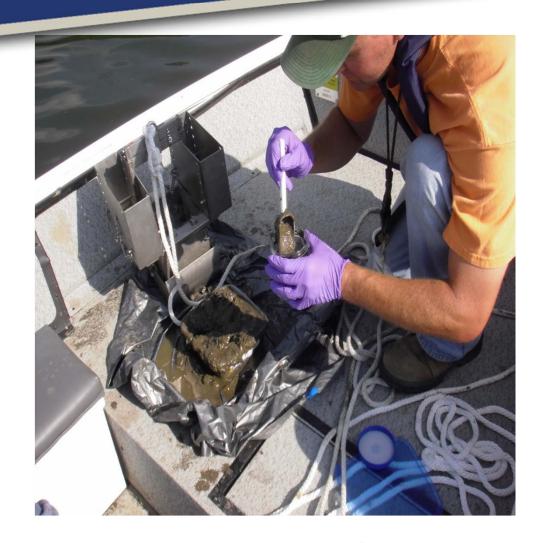
#### **Immediate Actions: Laboratories**

- Laboratory site visits
- EDD specifications in contract
- Data deliverables (Level I, Level IV)
- Helping client understand that the typical laboratory cannot provide 24-hour turnaround-time for extended periods



#### Immediate Actions: Field Oversight

- Review Field Sampling Plans
- Sample crew trainingconsistency.
- Implement SOPs.
- Sub-contactor brought in excellent work ethic and quality process – no "recalibration"





#### **Activities & Challenges**

#### Technical Tasks

- Prepare Technical Requirements and RFP for the Procurement of Laboratories
- Assess comparability of inter-laboratory data
- Establish a Long Term Sample Retain Program
- Establish a Rugged Laboratory PE Program
- Support and Oversee Plaintiff/Third Party Sampling requests



## Activities

- TVA collected data for many reasons Community Outreach, Worker Safety, Spill Investigation, Characterization, and Delineation, Regulatory Compliance, Waste Characterization, and many special studies
  - 310 Ash samples
  - 1686 Biota samples (Amphibians, Birds, Fish, Mammals, Vegetation, etc.)
  - 113 Ground Water samples
  - 4055 Particulate Matter samples
  - 354 Sediment samples
  - 87 Soil samples
  - 4053 Surface Water samples
- Over 600K analytical records, >1.2M related parameters, and >2M monitoring readings for Air and river water

#### Accomplishments

- Develop and support a business process that minimizes time from sample collection to release while ensuring that data were releasable.
- Establish a Quality Assurance Protocol and QAPP.
- Established a laboratory program.
- Prepared over 55 SOPs.
- Performed training and field oversights.



#### Interesting things along the way...

- Dry-weight versus wet-weight versus as received reporting
- Laboratories don't always follow the published method or their own SOP
- Lead contamination weights used for surface water sampling points were sources of contamination
- Defensible (truly) reporting down to a project method detection limit
- Legacy contamination of sediments prior to spill



#### Interesting things along the way...

- Evaluation of custody seals.
- Using disposable in line 0.45 micron filters, although expensive, saves time, money and minimize the potential of contamination from excessive sample handling
- Blue ice does not cool samples. An ice bath is needed to cool samples.
- Proper fly ash homogenization requires tremendous effort.



## Interesting things along the way...

Catching snapping turtles is tricky business





#### Conclusions

- Every Emergency Response starts off on the wrong foot...and behind in data reporting
- Emergency Response requires a different type of project planning and implementation – optimize for speed while appropriately adding control
- Labs and consultants that are nearest and dearest to the organization are not necessarily the best fit for the emergency.
- Understand that some data collected is not going to meet your needs.



- Plans, Processes, and Partners
  - Things to contemplate that should help
    - Have "on the shelf"
      - Quality Assurance Plan
      - Data Management Plan
      - Record Retention Plans
      - Framework for SOPs
- Making it up on the fly during the emergency response is too hard.



- If that doesn't work....more things to contemplate that should help
  - Difficult to staff an emergency response with internal personnel who already have jobs
    - Have Relationships/Partners "on the shelf" as well
      - Quality and Data Management
      - Field Sampling
      - Analytical Laboratories
      - Data Interpreters/Risk Assessors



- One cannot do enough to reduce confusion!
  - Until formal plans are in place, consider using an Analytical Request Form (ARF) in the early going!
    - Easy to implement
      - Collects information on
        - Reason for sample / data collection
        - What test / analytical sensitivities are desired
        - Who receives results or interprets the data



- Why am I harping on Quality Assurance and Data Management?
  - In the end all you have is data...





#### "Setting the Standards for Innovative Environmental Solutions"

Stephen D. Brower
Environmental Standards, Inc.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482
610.935.5577
sbrower@envstd.com
www.envstd.com

